



ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Water

Total Maximum Daily Load Summary for Klag Bay in Sitka, Alaska

February 2009

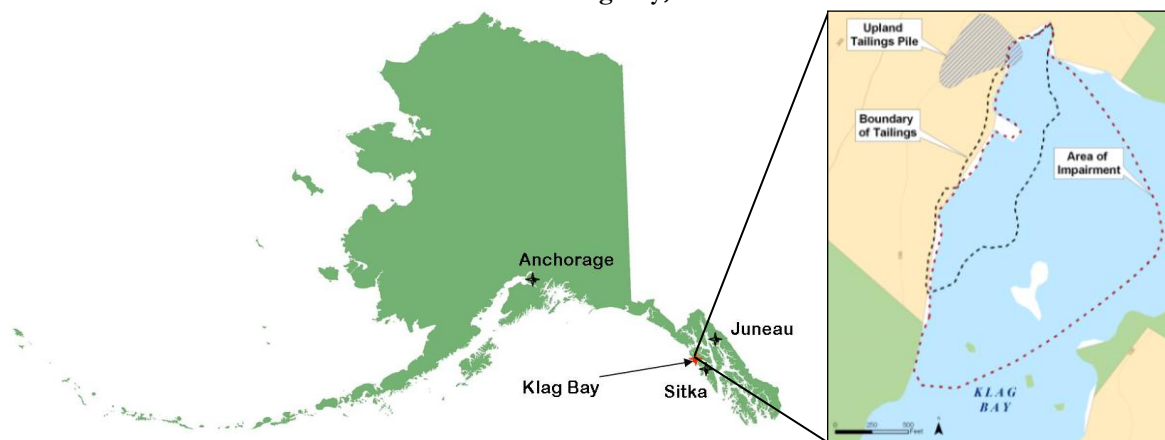
TMDL AT A GLANCE

<i>Water Quality Limited?</i>	Yes
<i>Alaska ID Number:</i>	10203-602
<i>Criteria of Concern:</i>	Toxic and other Deleterious Organic and Inorganic Substances
<i>Designated Uses Affected:</i>	Water supply; water recreation; growth and propagation of fish, shellfish, other aquatic life, and wildlife
<i>Major Source(s):</i>	Historical mine tailings deposits
<i>Loading Capacity:</i>	Varies by parameter (see table below)
<i>Wasteload Allocation:</i>	Zero mg/kg
<i>Load Allocation:</i>	Varies by parameter (see table below)
<i>Margin of Safety:</i>	Explicit for mercury, copper, lead, silver, and zinc; and implicit for arsenic, manganese, and cobalt

Necessary Load Reduction to Meet State Water Quality Standards: Varies by parameter (see table below)

Metals	Highest Observed Sediment Concentration (mg/kg)	WLA (mg/kg)	LA (mg/kg)		MOS (mg/kg)	Loading Capacity (mg/kg)	% Reduction Needed to Meet the TMDL
			Background	Anthropogenic			
Mercury	4.53	0	0.106	0.029	0.015	0.15	96.7%
Arsenic	844.0	0	21.3	0.0	0.0	21.3	97.5%
Copper	97.8	0	21.35	9.25	3.4	34.0	65.2%
Lead	350.0	0	4.625	37.405	4.67	46.7	86.7%
Silver	8.0	0	0.6	0.3	0.1	1.0	87.5%
Zinc	357.0	0	64.95	70.05	15.0	150.0	58.0%
Cadmium	5.8	NA	9.75	NA	NA	9.75	TMDL Not Needed
Manganese	728.0	0	181.5	0.0	0.0	181.5	75.1%
Cobalt	17.9	0	2.99	0.0	0.0	2.99	83.3%

Location of Klag Bay, Alaska



Scope of the TMDL

This Total Maximum Daily Load (TMDL) establishes limits for metals entering Klag Bay from new operations. The TMDL is established to meet the requirements of Section 303(d)(1) of the Clean Water Act. A TMDL is composed of the sum of individual waste load allocations (WLA) for point sources and load allocations (LA) for nonpoint sources and

natural background loads. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. A TMDL represents the amount of a pollutant the waterbody can receive while maintaining compliance with applicable water quality standards.

History & Background

Between 1906 and 1942 the Chichagof Mining Company operated gold and silver mines in Klag Bay. The mines used a mercury amalgamation process and cyanide method processing. Studies conducted by the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency documented high levels of metals (arsenic, cadmium, cobalt, copper, lead, manganese, mercury, silver, and zinc) in the bay's sediments, which were causing abnormalities in blue mussels. These findings resulted in the State of Alaska including Klag Bay on its 1996 303(d) list. During mining operations, an estimated 700,000 tons of tailings were deposited into the intertidal and subtidal zones and adjacent uplands. Approximately 54 acres encompassing the inner bay, tailings area and area up-gradient of the tailings is still considered impaired.

Standards, Loading Capacity, and Allocations

This TMDL was developed using the most stringent criterion, "Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife." This criterion specifies that there may be no concentrations of toxic substances in water or in shoreline or bottom sediments, that, singly or in combination, cause or reasonable can be expected to cause, adverse effects on aquatic life or produce undesirable or nuisance aquatic life. Because this standard is narrative and non-numeric, ADEC used numeric toxicological screening criteria developed by the National Oceanic and Atmospheric Administration to establish the numeric targets for this TMDL. ADEC used the conservative but still predictive of toxicity limit known as the Effect Range Low (ERL) as the TMDL target, as below ERL criteria, minimal effects on aquatic life are observed; values at or above ERL levels are those at which toxicity may begin to be observed in sensitive species. ERL criteria were not available or deemed not appropriate for arsenic, cadmium, cobalt, and manganese. ERLs are not available for manganese and cobalt, and estimated background concentrations for arsenic and cadmium are higher than the ERLs for these metals, which may suggest naturally elevated presence of these metals in the sediments and source rock within the area. Therefore, the TMDLs for arsenic, cadmium, cobalt, and manganese were developed using the average background sample concentration as the numeric target, which represents a conservative approach to developing the TMDL given known available data and information.

The TMDL establishes a WLA in Klag Bay of zero mg/kg/day and a LA equal to the ERLs (minus the MOS) or average background levels. Based on the WLA, no future discharge of mine waste will be permitted in the area until such time as water quality standards are met or the TMDL is revised. If future activity is proposed at the Klag Bay site that will entail discharge of toxic or other deleterious organic and inorganic substance discharges into Klag Bay, the TMDL may be revised to include modified WLAs. Possible revision of the WLA in this TMDL will depend on analysis of relevant factors at that time.

Margin of Safety

This TMDL establishes an implicit MOS for arsenic, manganese, and cobalt based on conservation assumptions in

the TMDL analysis; and an explicit MOS of 10% of the loading capacity for mercury, copper, lead, silver and zinc.

Implementation

Given that toxic substances in Klag Bay will persist for a substantial but unknown period, it is not feasible to establish an exact time frame in which Klag Bay will achieve recovery to a "natural condition," as immediate compliance with this target would require removal or capping of all toxic substances and such action is not recommended for Klag Bay due to the high potential for resuspension of toxic substances in the water column, disruption to the fish and benthic community, technical feasibility, costs, and waste disposal issues. Therefore, monitored natural recovery is the recommended alternative. If, however, natural recovery does not result in acceptable decreased concentrations of the metals and compliance with the targets set by this TMDL, then in-situ capping or other options should be explored.

The TMDL also recommends restricting future development which might disturb the existing tailings pile or marine sediments within the inner bay and posting warning signs about the contamination.

Monitoring

Monitoring will allow ADEC to track the progress of changes in water and sediment and determine whether acceptable progress is being made. Monitoring recommendations include planning and implementing a field sampling program to collect data to monitor changes in contaminant concentrations, and possibly the status of biological recovery at the site. Monitoring should be implemented on a schedule that allows for a statistical evaluation of surface and subsurface intervals. Future sampling efforts in Klag Bay also should include additional background samples in undisturbed areas near Klag Bay in order to further define background concentrations.

TMDL Public Review

A public review and comment period for the draft TMDL is underway. Written public comments must be mailed, faxed, e-mailed, or hand delivered to the addresses below by 5 p.m. on April 2, 2009.

A copy of the draft TMDL is available on ADEC's website: www.state.ak.us/dec/water/wnpssp/index.htm or upon request by writing, emailing, or calling ADEC:

Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501-1795
Attn: Timothy Stevens
Email: tim.stevens@alaska.gov
Phone: (907) 269-7515
Fax: (907) 269-7508